JAN 27 2014

510(k) Summary

Introduction

According to the requirements of 21 CFR 807.92, the following information provides sufficient detail to understand the basis for a determination of substantial equivalence.

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Device Name

Proprietary name:	(1) Elecsys FT4 II Assay (2) Elecsys FT4 II CalSet
Common name:	(1) FT4 II Assay (2) FT4 II Calibrator
Classification name:	(1) Radioimmunoassay, Free thyroxine test system (2) Calibrator
Product Codes:	(1) CEC, 21 CFR 862.1695 (2) JIT, 21 CFR 862.1150
Predicate Devices:	(1) Elecsys FT4 Assay (K961489) CEC, 21 CFR 862.1695 (2) Elecsys FT4 CalSet (K961489) JIS, 21 CFR 862.1150

Establishment Registration

For the Elecsys FT4 II Assay and the Elecsys FT4 II CalSet, the establishment registration number for Roche Diagnostics GmbH in Mannheim, Germany, is 9610126 and for Penzberg, Germany, is 9610529. The establishment registration number for Roche Diagnostics United States is 1823260.

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Device Description

1) The Elecsys F4 II Assay is a quantitative test for determination of free thyroxine in human serum and plasma. The total duration of the assay is 18 minutes. Elecsys FT4 II is a two-step competitive immunoassay with streptavidin microparticles, T4-specific polyclonal anti-T4-antibody (sheep) labeled with a sulfonyl-ruthenium complex, and electrochemiluminescence detection. Results are determined via a calibration curve which is instrument-specifically generated by a two-point calibration and a master curve provided via the reagent barcode.

(2) The Elecsys FT4 II CalSet is a ready-for-use buffer/protein (bovine serum albumin) matrix with added L-Thyroxine in two concentration ranges.

- FT4 II Cal1: 2 bottles, each containing 1.0 mL of calibrator 1
- FT4 II Cal2: 2 bottles, each containing 1.0 mL of calibrator 2

Note: The reagent and calibrator are packaged separately.

Intended Use/ Indications for Use

- **Elecsys FT4 II Reagent:**
  The Elecsys FT4 II Assay is for the in vitro quantitative determination of free Thyroxine in human serum and plasma. Measurements obtained by this device are used in the diagnosis and treatment of thyroid diseases.

  The electrochemiluminescence immunoassay "ECLIA" is intended for use on Elecsys and **cobas e** immunoassay analyzers.

- **Elecsys FT4 II CalSet:** Elecsys FT4 II CalSet is used for calibrating the quantitative Elecsys FT4 II assay on the Elecsys and **cobas e** immunoassay analyzers.

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Substantial Equivalence

The Elecsys FT4 II Test System is substantially equivalent to other devices legally marketed in the United States.

(1) Elecsys FT4 II Assay is equivalent to the Elecsys FT4 Assay (K961489).

(2) Elecsys FT4 II CalSet is equivalent to the Elecsys FT4 CalSet (K961489).

Substantial Equivalence - Comparison

The following tables compare the Elecsys FT4 II Test System and the Elecsys FT4 II CalSet with their predicates.

Comparison of Assays—Similarities and Differences

Assay Comparison		
Feature	**Elecsys FT4 II Assay**	**Predicate Device: Elecsys FT4 Assay (K961489)**
General Assay Features		
Intended Use/ Indications for Use	The FT4 II Assay is for the in vitro quantitative determination of free Thyroxine in human serum and plasma. Measurements obtained by this device are used in the diagnosis and treatment of thyroid diseases. The electrochemiluminescence immunoassay "ECLIA" is intended for use on Elecsys and **cobas e** immunoassay analyzers.	Immunoassay for the in vitro quantitative determination of free Thyroxine in human serum and plasma. The electrochemiluminescence immunoassay "ECLIA" is intended for use on Elecsys and cobas e immunoassay analyzers.
Assay Protocol	Quantitative electrochemiluminescence immunoassay	Same
Detection Protocol	Electrochemiluminescence	Same
Applications	18-minute application	Same

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Comparison of Assays—Similarities and Differences, *continued*

Assay Comparison		
Feature	**Elecsys FT4 II Assay**	**Predicate Device: Elecsys FT4 Assay (K961489)**
General Assay Features		
Instrument Platform	**cobas e** 411,	**cobas e** 411, Elecsys 2010, MODULAR ANALYTICS E170, **cobas e** 411, **cobas e** 601 and **cobas e** 602
Sample Volume	15 µL	Same
Sample Type	Undiluted human serum and undiluted plasma treated with Li-heparin, K2-EDTA, and K3-EDTA.	Undiluted human serum and undiluted plasma treated with Li-, Na-, NH+4 - heparin, K3-EDTA, sodium citrate, and sodium fluoride/potassium oxalate.
Reagents	The Elecsys FT4 II assay is a competitive immunoassay which includes a specific polyclonal anti-T4-antibody (sheep) labeled with a sulfonyl-ruthenium complex, thyroxine labeled with biotin and streptavidin coated microparticles.	The Elecsys FT4 assay is a competitive immunoassay which includes a specific anti-T4 antibody labeled with a ruthenium complex, thyroxine labeled with biotin and streptavidin coated microparticles.
Calibrator	Elecsys FT4 II CalSet, 2 levels	Elecsys FT4 CalSet, 2 levels
Calibration Interval	Calibration of an Elecsys FT4 II reagent lot is recommended every 28 days. During that time period, fresh reagent kits of the same lot can be used without calibration by using the calibration curve of the Day 0 reagent kit. Renewed calibration is recommended as follows: • After 1 month (28 days) when using the same reagent lot. • After 7 days (when using the same reagent kit on the analyzer). As required: e.g. quality control findings outside the specified limits	Same
Controls	Elecsys PreciControl Universal or other suitable control material	Same

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Comparison of Assays—Similarities and Differences, *continued*

Assay Comparison		
Feature	**Elecsys FT4 II Assay**	**Predicate Device: Elecsys FT4 Assay (K961489)**
General Assay Features		
Traceability / Standardization	The Elecsys FT4 II Assay has been standardized against the Elecsys FT4 method. The Elecsys FT4 assay is traceable to the Enzymun-Test which was standardized using equilibrium dialysis.	The Elecsys FT4 Assay has been standardized against the Enzymun-Test FT4 method, which was standardized using equilibrium dialysis.
Reagent Stability	Unopened at 2-8 °C—up to stated expiration date After opening at 2-8 °C—84 days (12 weeks) On the Elecsys and **cobas e** immunoassay analyzers – 28 days (4 weeks) onboard or 56 days when stored alternatively in the refrigerator and on the analyzer, with the total time onboard the analyzer not exceeding 120 hours.	Same Same On the Elecsys and **cobas e** immunoassay analyzers – 4 weeks onboard

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Comparison of Assays—Similarities and Differences, *continued*

Assay Comparison		
Feature	**Elecsys FT4 II Assay**	**Predicate Device: Elecsys FT4 Assay (K961489)**
Labeled Performance Characteristics		
Measuring Range	0.1 ng/dL to 7.77 ng/dL (1.3 - 100 pmol/L)	0.300-100 pmol/L
Precision	***cobas e** 411:* Within-run (will be labeled Repeatability) n=84, human sera HS 1: 4.0% CV @ 0.138 ng/dL (1.78 pmol/L) HS 2: 1.3% CV @ 1.03 ng/dL (13.3 pmol/L) HS 3: 1.3% CV @ 1.90 ng/dL (24.5 pmol/L) HS 4: 1.7% CV @ 4.93 ng/dL (63.5 pmol/L) HS 5: 1.8% CV @ 7.09 ng/dL (91.2 pmol/L) Total (will be labeled Intermediate) HS 1: 7.6% CV @ 0.138 ng/dL (1.78 pmol/L) HS 2: 2.3% CV @ 1.03 ng/dL (13.3 pmol/L) HS 3: 2.1% CV @ 1.90 ng/dL (24.5 pmol/L) HS 4: 3.3% CV @ 4.93 ng/dL (63.5 pmol/L) HS 5: 4.5% CV @ 7.09 ng/dL (91.2 pmol/L)	Elecsys 2010 and ***cobas e** 411:* Within-run (will be labeled Repeatability) n=60, human sera HS 1: 1.6% CV @ 8.7 pmol/L HS 2: 1.7% CV @ 21.1 pmol/L HS 3: 2.9% CV @ 50.8 pmol/L Total (will be labeled Intermediate) HS 1: 3.5% CV @ 8.7 pmol/L HS 2: 3.3% CV @ 21.1 pmol/L HS 3: 6.6% CV @ 50.8 pmol/L *MODULAR ANALYTICS E170, **cobas e** 601, and **cobas e** 602:* Within-run (will be labeled Repeatability) n=60, human sera HS 1: 1.4% CV @ 9.15 pmol/L HS 2: 1.8% CV @ 16.9 pmol/L HS 3: 2.0% CV @ 34.2 pmol/L Total (will be labeled Intermediate) HS 1: 2.7% CV @ 14.9 pmol/L HS 2: 2.6% CV @ 17.5 pmol/L HS 3: 3.6% CV @ 42.7 pmol/L

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Comparison of Assays—Similarities and Differences, *continued*

<table>
<tr><th colspan="3">Assay Comparison</th></tr>
<tr><th>Feature</th><th>Elecsys FT4 II Assay</th><th>Predicate Device: Elecsys FT4 Assay (K961489)</th></tr>
<tr><td colspan="3">Labeled Performance Characteristics</td></tr>
<tr><td>Analytical Sensitivity</td><td>Limit of Blank (LoB): 0.03 ng/dL (0.4 pmol/L)
Limit of Detection (LoD): 0.05 ng/dL (0.6 pmol/L)
Limit of Quantitation (LoQ) (Functional Sensitivity) 0.1 ng/dL
(1.3 pmol/L) with an intermediate precision of ≤ 20%</td><td>Lower Detection Limit: 0.300 pmol/L</td></tr>
<tr><td>Analytical Specificity</td><td><table><tr><th>Cross Reactant</th><th>Cross Reactivity (%)</th></tr><tr><td>L-T3</td><td>≤ 0.005</td></tr><tr><td>D-T3</td><td>≤ 0.001</td></tr><tr><td>rT3</td><td>≤ 0.003</td></tr><tr><td>3-iodo-L-trosine</td><td>≤ 0.000</td></tr><tr><td>3,5-diiodo-L-tyrosine</td><td>≤ 0.000</td></tr><tr><td>3,3',5-triiodohy□oacetic acid</td><td>≤ 0.0002</td></tr><tr><td>3,3',5,5'-tetraiodothyroacetic acid</td><td>≤ 0.001</td></tr></table></td><td><table><tr><th>Cross Reactant</th><th>Cross Reactivity (%)</th></tr><tr><td>L-T4</td><td>100</td></tr><tr><td>D-T4</td><td>100</td></tr><tr><td>L-T3</td><td>1.53</td></tr><tr><td>D-T3</td><td>1.38</td></tr><tr><td>3-iodo-L-tyrosine</td><td>0.002</td></tr><tr><td>3,5-diiodo-L-tyrosine</td><td>0.01</td></tr><tr><td>3,3',5,5;-tetraiodothyroacetic acid</td><td>38.5</td></tr></table></td></tr>
<tr><td>Hook Effect</td><td>There is no high-dose hook effect since the Elecsys FT4 II assay is a competitive assay</td><td>Same</td></tr>
<tr><td>Limitations</td><td>The assay is unaffected by:
Icterus (bilirubin < 701 µmol/L or < 41 mg/dL)
Hemolysis (Hb < 0.621 mmol/L or < 1.0 g/dL)
Lipemia (Intralipid < 2000 mg/dL)
Biotin (< 81.8 nmol/L or < 20 ng/mL)
Albumin <6.3 g/dL
IgG < 7 g/dL
IgA < 1.6 g/dL
IgM < 1 g/dL</td><td>The assay is unaffected by:
Icterus (bilirubin < 701 µmol/L or < 41 mg/dL)
Hemolysis (Hb < 1.2 mmol/L or < 2 g/dL)
Lipemia (Intralipid < 2000 mg/dL)
Biotin (< 409 nmol/L or < 100 ng/mL)
IgG < 7 g/dL
IgM < 2 g/dL.</td></tr>
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510(k) Summary, *continued*

Comparison of Assays—Similarities and Differences, *continued*

Characteristic	CalSet for Elecsys FT4 II Assay	Predicate Device: Elecsys FT4 Assay (K961489)
Intended Use	Elecsys FT4 II CalSet is used for calibrating the quantitative Elecsys FT4 II assay on the Elecsys and **cobas e** immunoassay analyzers.	Same
Levels	Two	Same
Matrix	Buffer/protein (bovine serum albumin) matrix	Same
Format	Liquid	Same
Stability	Unopened: • Store at 2 - 8°C up to the stated expiration date. After opening/in aliquots: • At 2 - 8°C: 12 weeks • On Elecsys 2010/**cobas e** 411 at 20°C: Up to 5 hours. • On MODULAR ANALYTICS E170/**cobas e** 601 and **cobas e** 602: Use only once.	Same
Handling	The calibrators are supplied ready-for-use in bottles compatible with the system	Same

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Standard/ Guidance Document Reference

In addition to FDA guidance regarding 510(k) submissions, the following standards were used for the performance studies.

- Evaluation of Precision Performance of Quantitative Measurement Methods; Approved Guideline – Second Edition. CLSI document EP5-A2, Volume 24, No. 25, August 2004.
- Evaluation of Detection Capability for Clinical Laboratory Measurement Procedures; Approved Guideline – Second Edition. CLSI document EP 17-A2, Volume 32, No. 8, June 2012.
- Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach; Approved Guideline. CLSI document EP6-A, Volume 23, No. 16, April 2003.
- Defining, Establishing, and Verifying Reference Intervals in the Clinical Laboratory; Approved Guideline – Third Edition. CLSI document C28-A3c, Volume 28, No. 30, October 2010 (corrected version).

Performance Studies Summary

The Elecsys FT4 II Assay was evaluated for several performance characteristics, including precision, limit of blank, limit of detection, limit of quantitation, linearity, method comparison, interfering substances, and calibration and reagent stability. There were no modifications to the Elecsys FT4 II CalSet from the Elecsys FT4 CalSet other than the name and catalog number.

1. **Precision (CLSI EP5-A2):** The precision of the Elecsys FT4 II assay was evaluated on one **cobas e** 411 Immunoassay Analyzer according to CLSI EP5-A2 guideline. Repeatability and Intermediate precision were calculated according to EP5-A2.

   The protocol consisted of testing 2 replicates of each human serum sample and control per run, two (2) runs per day (whereas the runs were divided by dummy samples) for 21 days.

   Specification for Repeatability/within-run precision:
   - Concentrations of $\leq$ 0.4 ng/dL: SD $\leq$ 0.02 ng/dL
   - Concentrations of > 0.4-7.77 ng/dL: CV $\leq$ 5%

   Specification for Intermediate/within-laboratory precision:
   - Concentrations of $\leq$ 0.4 ng/dL: SD $\leq$ 0.03 ng/dL
   - Concentrations of > 0.4-7.77 ng/dL: CV $\leq$ 8%

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Performance Studies Summary, *continued*

The table below summarizes the results of the precision studies performed with the Elecsys FT4 II test system. Based on these data, the precision meets the specifications.

Sample	Mean (ng/dL)	Repeatability			Intermediate Precision			n
		SD (ng/dL)	CV (%)	95% UCL* (% or ng/dL)	SD (ng/dL)	CV (%)	95% UCL* (% or ng/dL)	
PCU 1	1.22	0.011	0.9	1.1	0.022	1.8	2.4	84
PCU 2	3.11	0.032	1.0	1.3	0.089	2.9	3.9	84
HS 1	0.138	0.006	4.0	0.007 ng/dL	0.011	7.6	0.014 ng/dL	84
HS 2	1.03	0.013	1.3	1.6	0.023	2.3	2.9	84
HS 3	1.90	0.024	1.3	1.6	0.040	2.1	2.8	84
HS 4	4.93	0.082	1.7	2.1	0.163	3.3	4.4	84
HS 5	7.09	0.127	1.8	2.3	0.319	4.5	6.2	84

* Upper confidence limit

2. **Limit of Blank (LoB) (CLSI EP17-A2):** LoB of the Elecsys FT4 II assay on two **cobas e** 411 Immunoassay Analyzers has been determined according to CLSI EP17-A2 using three reagent lots.

   The distribution of values for one analyte-free human serum sample has been determined on two **cobas e** 411 Immunoassay Analyzers over four days, one or two runs per day with five-fold determination in each run; (total 60 determinations).

   Since there are no natural human samples without FT4 analyte, the analyte-free sample was created by depleting T4. As the analyzers do not report negative sample concentrations, the data set is truncated and the data were evaluated according to EP17-A2, 5.3.3.1 as the linear interpolation of the 57th and 58th ranked observation.

   The LoB claim in the package insert will be set to ≤ 0.03 ng/dL.

3. **Limit of Detection (LoD) (CLSI EP17-A2):** LoD of the Elecsys FT4 II assay has been determined according to CLSI EP17-A2, 5.3.3.2.

   The distribution of values for five low-level human serum samples has been determined on two **cobas e** 411 immunoassay analyzers over four days, one or two runs per day with a single measurement per run.

   A pooled estimate of the precision (SD_{total}) for the 5 low level samples was calculated: LoD = LoB + 1.653 x SD total (of low analyte samples)

   The LoD claim in the package insert will be set to ≤ 0.05 ng/dL.

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Performance Studies Summary, *continued*

4. **LoQ / Functional Sensitivity (CLSI EP17-A2):** The LoQ of the Elecsys FT4 II assay was determined on the **cobas e** 411 immunoassay analyzer according to CLSI Guideline EP17-A2.

   A Low-Level Sample Set of 8 samples was prepared by diluting native human serum samples with an analyte-free human serum matrix and were tested in single replicates for four days, one or two runs per day on two **cobas e** 411 immunoassay analyzers. Each run was calibrated separately using a two-point calibration in combination with the master curve stored on the reagent barcode. The Elecsys PreciControl Universal was tested and evaluated for each run to determine assay validity.

   The mean, standard deviation and coefficient of variation for each sample were calculated. Functional sensitivity as the concentration corresponding to a coefficient of variation of 20% was obtained from plotting the %CV (y-axis) vs. measured FT4 values (x-axis).

   Acceptance criterion:
   - Interassay coefficient of variation $\leq 20\%$

   The Limit of Quantitation/Functional sensitivity claim in the package insert will be set to 0.1 ng/dL.

   The following results were obtained:

Lot MP02:	Functional sensitivity = 0.059 ng/dL
Lot P2:	Functional sensitivity = 0.069 ng/dL
Lot P3:	Functional sensitivity = 0.080 ng/dL

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Performance Studies Summary, *continued*

5. **Linearity (CLSI EP6-A):** Linearity of the Elecsys FT4 II assay was assessed on the **cobas e** 411 Immunoassay Analyzer according to CLSI EP6-A.

   Three high analyte serum sample pools (spiked with L-Thyroxine) were diluted with fT4 depleted human serum. For each sample pool, 13 concentrations (11 dilutions) throughout the measuring range were prepared. Samples were assayed in 3-fold determination within a single run.

   The linearity data were analyzed with regards to linear, quadratic and cubic polynomials according to CLSI EP6-A. In the first step, a linearity check was performed with a first order (linear) regression and then with higher order models (quadratic and cubic).

   Acceptance criteria:
   Significance level for deviation to higher order polynomial: 5%

   Limits for deviation of higher order polynomial regression:
   - 0.1 - 0.388 ng/dL: ± 0.078 ng/dL
   - > 0.388 – 7.77 ng/dL: ± 10 %

   Repeatability for linearity:
   - 0.1 - 0.388 ng/dL: ± 0.039 ng/dL
   - > 0.388 – 7.77 ng/dL: ± 5 %

   Linearity was confirmed in the range from 0.096 to 8.20 ng/dL

6. **Specificity/Cross Reactivity:** The specificity of the Elecsys FT4 II assay was determined using native human serum samples or human serum samples spiked with L-Thyroxine (single donors) spiked with potential cross-reactant compounds tested in duplicate on **cobas e** 411 Immunoassay Analyzer.

   In the labeling, Roche will report the maximum cross-reactivity found and the highest concentration tested. See table below.

Cross Reactant	Cross Reactivity (%)
L-T3	≤ 0.005
D-T3	≤ 0.001
rT3	≤ 0.003
3-iodo-L-trosine	≤ 0.000
3,5-diiodo-L-tyrosine	≤ 0.000
3,3',5-triiodohyroacetic acid	≤ 0.000
3,3',5,5'-tetraiodothyroacetic acid	≤ 0.001

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Performance Studies Summary, *continued*

7. **Exogenous Interferences - Drugs:** 17 pharmaceutical compounds (concentration defined as x times the maximum daily dose according to the SOP) and 12 thyroid drugs and Furosemide were spiked into human serum samples (human serum pools spiked with L-Thyroxine) and tested with the Elecsys FT4 II assay on the **cobas e** 411 Immunoassay Analyzer.

   Two samples with approximately1.1 ng/dL and 2.6 ng/dL of fT4 were divided into aliquots and spiked with potential interferents. The reference sample, without interferents, was spiked with the respective amount of solvent only.

   The fT4 concentration of the spiked aliquots was determined in triplicate and compared to the fT4 concentration determined for the reference aliquot (6-fold determination) on one **cobas e** 411 Immunoassay Analyzer.

   Acceptance criterion: 100 ± 10% of the reference value (unspiked sample)

   Each compound, except Levothyroxine and Furosemide, was found to be non-interfering at the concentration listed below. Levothyroxine and Furosemide will be listed as interfering substances in the "Limitations – Interference" section of the package insert.

8. **Exogenous Interferences - Anticoagulants:** The effect on quantitation of analyte in the presence of anticoagulants with the Elecsys FT4 II Immunoassay was determined by comparing values obtained from native samples or samples spiked with L-Thyroxine (single donors) drawn into serum, Li-Heparin, K2-EDTA-, and K3-EDTA-plasma primary tubes, and Li-Heparin Plasma Separation Tubes.

   Between 53 and 63 serum/plasma pairs per sample material were tested in single determination with one reagent lot on one **cobas e** 411 Immunoassay Analyzer.

   Potential effects are assessed by Passing/Bablok regression and linear regression analysis.

   Acceptance criteria:
   - Slope 0.9 – 1.1
   - Intercept $< \pm$ 0.05 ng/dL
   - Coefficient of correlation $r \geq 0.95$

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510(k) Summary, *continued*

Performance Studies Summary, *continued*

Acceptance criterion for single pairs:
- LoD - < 0.3 ng/dL: ± 0.05 ng/dL
- ≥ 0.3 – 7.77 ng/dL: ± 10 % of reference value

Conclusion: The specifications were met for all anti-coagulants. The resulting data support the package insert claim that serum, Li-Heparin, K2-EDTA-, and K3-EDTA-plasma specimens are acceptable sample types for use with the Elecsys FT4 II Immunoassay.

9. **Endogenous Interferences:** Effect on quantitation of analyte in the presence of endogenous interfering substances using the Elecsys FT4 II Immunoassay was determined on the **cobas e** 411 Immunoassay Analyzer using pooled human serum samples spiked with L-Thyroxine. For each interfering substance, 3 serum samples containing low, mid, and high concentrations of fT4 were tested.

   Acceptance criterion: Recovery of 100 ± 10% of unspiked reference value.

   The assay is unaffected by icterus (bilirubin < 701 µmol/L or < 41 mg/dL), hemolysis (Hb < 0.621 mmol/L or < 1.0 g/dL), lipemia (Intralipid < 2000 mg/dL), biotin (< 81.8 nmol/L or < 20 ng/mL), Albumin <6.3 g/dL, IgG < 7 g/dL, IgA < 1.6 g/dL and IgM < 1 g/dL.

10. **Method Comparison:** A method comparison study was performed to compare the FT4 II assay on the **cobas e** 411 (Y) with the FT4 assay on the **cobas e** 411 (X) Immunoassay Analyzer (predicate test system).

    A total of 170 human serum samples obtained from serum from commercial vendors or remnant clinical samples with fT4 values from 0.161 – 7.05 ng/dL were measured. Out of the 170 serum samples, 11 samples were spiked with analyte and 4 samples were diluted with an FT4 free serum. The results were calculated using the Passing/Bablok and Linear Regression analysis.

    Acceptance criteria for Passing/Bablok regression:

Slope:	1.00 ± 0.05
Intercept:	± 0.04 ng/dL
Correlation:	r ≥ 0.95

    Bias at medical decision points: ±10% at 0.93 ng/dL
    ±10% at 1.7 ng/dL

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Performance Studies Summary, *continued*

11. **Calibration Stability:** Calibration of an Elecsys FT4 II reagent lot is recommended every 28 days. During that time period, fresh reagent kits of the same lot can be used without calibration by using the calibration curve of the Day 0 reagent kit.

    Elecsys FT4 II was calibrated with a fresh reagent kit on Day 0 using a **cobas e** 411 Immunoassay Analyzer. After 29 days, a new reagent kit of the same lot was used and recovery of samples was determined using the calibration curve of Day 0. Samples tested included five human serum (HS) samples spiked with L-Thyroxine and two controls. Each sample was tested in duplicate.

    Acceptance criteria for recovery compared to day 0 value:
    Concentrations of LoD – 0.3 ng/dL: ± 0.05 ng/dL
    > 0.3 – 7.77 ng/dL: 100 ± 10 %

    Renewed calibration is recommended as follows:
    - After 1 month (28 days) when using the same reagent lot.
    - After 7 days (when using the same reagent kit on the analyzer).
    - As required: e.g. quality control findings outside the specified limits

12. **Reagent On-Board Stability:** Elecsys FT4 II reagent kits can be stored on board of the analyzers for up to 28 days and for 56 days when stored alternatively in the refrigerator and on the analyzer, with the total time on the analyzer not exceeding 120 hours. A new calibration of the kit kept on-board is recommended every 7 days.

    Acceptance criteria for recovery of samples compared to day 1:
    - Concentrations from LoD to 0.3 ng/dL: ± 0.05 ng/dL
    - Concentration of >0.3 to 7.77 ng/dL: 100± 10%

13. **Reagent Accelerated Stability:** Elecsys FT4 II reagent kits have a shelf life of ≥ 12 months when stored at 2-8°C.

    Accelerated reagent stability to estimate real time stability for the Elecsys FT4 II assay was tested on one **cobas e** 411 Immunoassay Analyzer.

    A kit was stored at 35°C for 3 weeks and recovery of human samples and controls were tested compared to a fresh kit stored at 2-8 °C.

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Performance Studies Summary, *continued*

Samples tested included five human serum (HS) samples spiked with L-Thyroxine, and two controls. Each sample was tested in two-fold determination.

Acceptance criteria for recovery of samples compared to day 0:

- Concentrations from LoD to 0.3 ng/dL: ± 0.05 ng/dL
- Concentration of >0.3 to 7.77 ng/dL: 100± 10%

14. **Reagent Real-Time Stability:** In the ongoing real-time stability study, the Elecsys FT4 II assay material is stored at 2-8°C. The stored assay reagents are tested at time point T=0 and at specified intervals over the shelf life of the device up to the planned shelf life plus one month. Testing was/will be performed using PreciControl Universal 1 and PreciControl Universal 2 (Stored at -20°C).

    Data for the time-points at 0, 7, 10, 13, 16, 19 and 25 months tested in duplicate will be available. The average on-test recovery value will be calculated as percent recovery compared to the reference value (Assigned value for PreciControl Universal 1 and PreciControl Universal 2).

    The acceptance criterion is recovery of 90-110% of the reference value.

    Currently, the shelf life claim is 12 months based on the accelerated stability results and real-time stability data. The testing will continue with this stability protocol until data to support a claim of 24 months is achieved.

15. **Reagent Stability after first opening (2-8°C):** Elecsys FT4 II reagent kits can be used after first opening for up to 84 days (12 weeks) when stored at 2-8°C.

    Reagent stability after first opening for the Elecsys FT4 II assay was tested on one **cobas e** 411 Immunoassay Analyzer with one reagent lot.

    A fresh kit was placed on the analyzer and calibrated. Reference values for the samples tested were determined. After measurement, the kit was removed from the analyzer and kept at 2-8 °C for up to 85 days. After 29, 57 and 85 days, the kit was placed on the analyzer again, calibrated, and the test samples were determined.

    Samples tested included five human serum (HS) samples spiked with L-Thyroxine, and two controls. Each sample was tested in two-fold determination.

Continued on next page

510(k) Summary, *continued*

Performance Studies Summary, *continued*

Acceptance criteria for recovery of samples compared to Day 0:
Concentrations of: ≤ 0.3 ng/dL: ± 0.05 ng/dL
> 0.3 – 7.77 ng/dL: 100 ± 10 %

Reagent stability after first opening for the Elecsys FT4 II assay was tested on one **cobas e** 411 Immunoassay Analyzer with one reagent lot. A fresh kit was placed on the analyzer and calibrated. Reference values for the samples tested were determined. After measurement, the kit was removed from the analyzer and kept at 2-8 °C for up to 85 days. After 29, 57 and 85 days, the kit was placed on the analyzer again, calibrated, and the test samples were determined.

Samples tested included five human serum (HS) samples spiked with L-Thyroxine, and two controls. Each sample was tested in two-fold determination.

Acceptance criteria for recovery of samples compared to Day 0:
Concentrations of: ≤ 0.3 ng/dL: ± 0.05 ng/dL
> 0.3 – 7.77 ng/dL: 100 ± 10 %

16. **Reference Range Validation Study (CLSI C28-A3c):** The Reference Range Validation Study was performed with 60 subjects (30 males and 30 females) with normal TSH values (0.270 – 4.20µIU/mL) as measured with the Elecsys TSH assay.

    Results have been checked for outliers applying the method of Dixon/Reed as described in C28-A3c 9.2. (R = 11.1, D = 1/3 R = 3.7). All 60 determinations are valid and no outliers needed to be excluded.

    Acceptance criterion: No more than 6 (10%) of the 60 tested subjects should fall outside of the established reference range of 0.93-1.7 ng/dL.

    The FT4 values of 2 of the 60 subjects investigated fall outside of the reference range established for the Elecsys FT4 assay. The acceptance criterion is met. The reference range of 0.93-1.7 ng/dL can be transferred to the Elecsys FT4 II assay.

Conclusion

The data demonstrate that the performance of the Elecsys FT4 II Assay is substantially equivalent to that of the predicate device, Elecsys FT4 Assay (K961489).

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-0002

January 27, 2014

ROCHE DIAGNOSTICS
EDIE EADS
REGULATORY AFFAIRS CONSULTANT
9115 HAGUE ROAD
INDIANAPOLIS IN 46250-0416

Re: K131244
Trade/Device Name: Elecsys FT4 II Assay, Elecsys FT4 II CalSet
Regulation Number: 21 CFR 862.1695
Regulation Name: Free thyroxine test system
Regulatory Class: II
Product Code: CEC, JIT
Dated: December 13, 2013
Received: December 16, 2013

Dear Ms. Eads:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulations (21 CFR Parts 801 and 809), please contact the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638 2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours.

Courtney H. Lias -S

Courtney H. Lias, Ph.D.
Division of Chemistry and Toxicology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

Indications for Use Form

510(k) Number (if known): k131244

Device Name: Elecsys FT4 II Assay, Elecsys FT4 II CalSet

Indications for Use:

The Elecsys FT4 II Assay is for the in vitro quantitative determination of free Thyroxine in human serum and plasma. Measurements obtained by this device are used in the diagnosis and treatment of thyroid diseases.

The electrochemiluminescence immunoassay "ECLIA" is intended for use on Elecsys and **cobas e** immunoassay analyzers.

Elecsys FT4 II CalSet is used for calibrating the quantitative Elecsys FT4 II assay on the Elecsys and cobas e immunoassay analyzers.

Prescription Use X (Part 21 CFR 801 Subpart D)	AND/OR	Over-The-Counter Use _____ (21 CFR 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE OF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostics and Radiological Health (OIR)

Yung [redacted] an -S

Division Sign-Off
Office of In Vitro Diagnostics and Radiological Health

510(k) k131244